Summaries of Wildlife Research Findings

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SUMMARIES OF WILDLIFE RESEARCH FINDINGS 2008

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ESTIMATING WHITE-TAILED DEER DENSITY USING TRAIL CAMERAS

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SUMMARY OF FINDINGS

White-tailed deer (*Odocoileus virginianus*) densities in the farmland zone of Minnesota are estimated using simulation modeling and aerial surveys. Simulation modeling is not well suited for modeling population dynamics in small areas, such as Itasca State Park (Permit Area 287). In 2005, Itasca State Park was chosen as a study area to test alternative deer hunting regulations. Deer density estimates were needed to evaluate the effect of antler-point restriction regulations (>3-points-on-a-side) on the deer population in the park. A trail camera study was initiated in 2006 to monitor the population. Forty-two cameras were systematically placed at a density of 1 camera/130 ha. The ratio of legal bucks to sub-legal bucks (fork and spike bucks) and buck:antlerless deer was calculated for 2, 3-week sampling periods before and after the hunting season. During 2006, cameras captured 12,486 images of deer, and in 2007 cameras captured 11,326 images of deer over the 6-week sampling period. The study was continued in 2008; data entry was not complete at the time this report was written.

INTRODUCTION

In 2005, Itasca State Park was chosen as a study area to test a 3-points-on-a-side antler-point restriction regulation for deer hunting. Deer density estimates were needed to evaluate the effect of the antler-point restriction on the density and demographics of the deer population. The primary management objective associated with the antler-point restriction was to reduce deer density by increasing the antlerless harvest via reductions in the antlered harvest (Grund et al. 2005).

Deer densities in Minnesota have traditionally been estimated using simulation modeling (Grund 2007, Lenarz 2007). Aerial surveys have been used in some farmland permit areas to provide an independent field estimate for correcting population models (Haroldson and Giudice 2006). However, due to errors caused by demographic stochasticity and seasonal movement patterns, simulation modeling is not recommended for small areas (Grund 2001). The small size of Itasca State Park (approximately 130 km^2) made population modeling impractical. Also, aerial surveys were not feasible due to dense coniferous cover that exists in parts of the park. While deer density estimates were not available for the park, the simulated deer density immediately north of the park was estimated at 65 deer/km^2 (25 deer/mi^2) in spring 2007 (Lenarz 2007).

Infrared-triggered cameras have been used to estimate deer populations in a variety of habitat types and study area sizes (Moore 1995, Jacobson et al. 1997, Koerth et al. 1997, Warlock et al. 1997, and Roberts et al. 2006). Jacobson et al. (1997) developed a camera technique to estimate deer density using known numbers of individually identifiable mature bucks and associated age and sex ratios from the deer herd. In Texas, Koerth et al. (1997) compared camera population estimates to helicopter counts and concluded that both techniques provided reliable deer density estimates.

In Fall 2005, a pilot study, initiated at Itasca State Park using infrared-triggered cameras, determined that: (1) more sampling effort was needed, (2) a systematic sampling design should be used, and (3) pre-baiting of sites was needed. In 2006, the study was adjusted to accommodate the pilot study findings. The study was continued in 2007 and in 2008; data entry from 2008 was not complete at the time this report was written.

OBJECTIVE

1. To determine the density and demographics of the deer herd to assess effects associated with the antler-point restriction regulation at Itasca State Park.

METHODS

The trail camera study was conducted at Itasca State Park, located in northwestern Minnesota in 2006-2008 from September to December. The park is approximately 130 km^2. The study area we used was approximately 6,400 ha located in the interior portion of the park in order to minimize effects that movement patterns would have on deer observations along the perimeter of the park. Following the protocol developed by Jacobson et al. (1997), 42 trail cameras were systematically placed at a density of 1 camera/130 ha throughout the study area using the Systematic Point Sample tool in ArcView 3.3. Minor adjustments were needed to avoid wetland areas (Figure 1).

Each site was located using a global positioning system unit and marked using flagging material. Cameras were in the field for 3 weeks before and after the regular firearms season for a total of 6 weeks each year. For the first sampling period (before the regular firearms deer hunting season), sites were baited with 23 kg (50 lbs) of shelled corn 3 weeks prior to placing the cameras in the field. An additional 11 kg (25 lbs) of corn was added to each site 1 week before camera sampling began. Sites were baited with 23 kg (50 lbs) of shelled corn 1 week before the second sampling period (after the regular firearms season).

A Bushnell TrailScout Pro 2.1 Mega Pixel (MP) or 3.0 MP trail camera was used at each site. Cameras were attached to a nearby tree at a height of 1.5 m. Each camera faced north and was 4-6 m from the established bait pile. Cameras were angled slightly downward to aim the infrared beam to a height approximately 1 m above the bait pile. In 2007, wooden boxes were constructed to house cameras to protect them from precipitation and damage by bears. Cameras were programmed to take pictures day and night with a 1-minute delay between pictures in 2006 and a 30-second delay between pictures in 2007. Batteries and memory cards were replaced on a weekly basis. Corn (11 kg) was added to the baited area on a weekly basis for both sampling periods in 2006, the first sampling period in 2007, and 23 kg was added to each site on a weekly basis for the second sampling period in 2007. These adjustments were made based on observed feeding patterns each season.

Each image was examined using Adobe Photoshop 3.0 or Microsoft Photo Editor, and only images of deer within the sampling time frame were used in the analysis. We classified each deer as legal buck (>3-points-to-a-side), sub-legal buck, or antlerless deer. Legal bucks were individually identified using number, size, and arrangement of points. We excluded images if we were unable to classify a deer to an appropriate category.

RESULTS AND DISCUSSION

In 2006, trail cameras captured 16,682 images during the 2, 3-week sampling periods. More images were captured during the postseason (9,346) than during the preseason period (7,336). Approximately 75% of the images contained a photo of a deer. Other species we observed included black bear (*Ursus americanus*), raccoon (*Procyon lotor*), bobcat (*Lynx rufus*), snowshoe hare (*Lepus americanus*), a variety of avian species, gray wolf (*Canis lupus*), mice (*Peromyscus* spp.), squirrels (*Sciurus* spp. and *Tamiasciurus hudsonicus*), chipmunks (*Tamias striatus*), fisher (*Martes pennanti*) and humans. Some images (16%) were eliminated due to: (1) images contained no visible animal, (2) the image was distorted, (3) the distance from the camera to the deer was too great, and (4) vegetation obstructed the view of the deer. Thus, 11,526 images containing 14,115 deer observations were useable for project purposes in 2006. During the preseason period in 2006, we observed 1,507 legal bucks, 811 sub-legal bucks, and

3,430 antlerless deer. During the postseason period in 2006, we observed 1,772 legal bucks, 1,519 sub-legal bucks, and 5,078 antlerless deer.

In 2007, trail cameras captured 21,486 images during the 2, 3-week sampling periods. Nearly equal numbers of images were captured during the postseason (10,754) and the preseason period (10,732). Approximately 53% of the images contained a photo of a deer. Species other than deer that were observed in 2007 included those seen in 2006 (except for fisher) and red fox (*Vulpes vulpes*) and porcupine (*Erethizon dorsatum*). Some images (27%) contained no visible animal, and distortion of the image, distance from the camera, or vegetation obstructing the view also caused some deer to be unidentifiable (6%). Thus, 11,326 images containing 13,380 deer observations were useable for project purposes in 2007. During the preseason period in 2007, we observed 440 legal bucks, 41 sub-legal bucks, and 3,294 antlerless deer. During the postseason period in 2007, we observed 2,218 legal bucks, 1,159 sub-legal bucks, and 6,228 antlerless deer.

Future work includes finishing data entry for 2008 and comparing population estimates for all three years (2006-2008) using Jacobson's (1997) mark-recapture technique and change-in-ratio formula (Paulik and Robson 1969).

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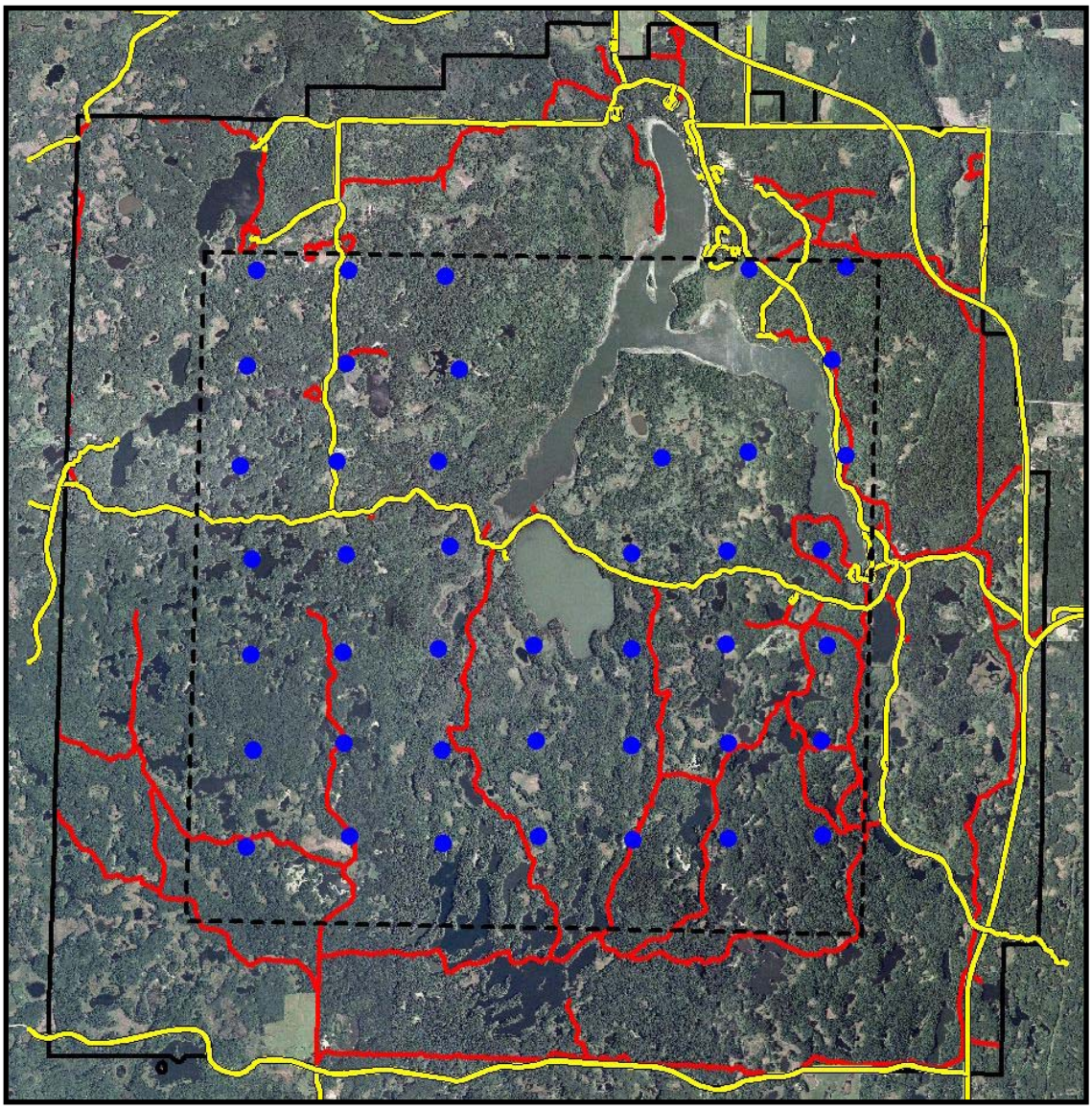

Figure 1. Locations of trail cameras (dots) in the study area (dashed line) at Itasca State Park, Minnesota in 2006-2008.